

ABSTRACT

Observations on aural symptoms and in particular on Tinnitus as a primary complaint and not associated with obvious aural disease suggest that, in what appears to be the majority of cases, the cause resides in the temporomandibular joint (TMJ). These clinical experiences are presented in order to stimulate our research minded colleagues to undertake a formal investigation. They may well have the facilities and means to perform statistical studies.

Hitherto obscure conditions such as dysacusis and temporary hyperacusis also appear to be caused by temporomandibular joint problems. The ENT Specialists in general have ignored or not realized the relationship between the TMJ and these symptoms, perhaps the Dentists will lead the way. A better liaison between Dentists and ENT Specialists should focus on the tinnitus aspect of TMJ problems so that effective management is developed.

Keys words: Tinnitus, Temporomandibular Joint, Malocclusion, Dysacusis, Hyperacusis, Presbyacusis

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TINNITUS and the TMJ

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Introduction

One of the commonest causes in patients referred to a general Ear Nose and Throat Specialist with tinnitus as a key or presenting symptom is that of temporomandibular joint dysfunction.

We have been conditioned to regard tinnitus as being due to any hearing loss that may be present. This assumption is not valid. The poor correlation with the incidence, nature and degree of hearing loss has often been ignored. Few have questioned why many patients with tinnitus have normal hearing, or why in bilateral hearing loss only one ear experiences the tinnitus regardless as to whether the hearing loss is symmetrical or not. Somatic tinnitus is a well recognized and widely explored cause of the symptom, yet figures little in the ENT literature. Somatic tinnitus can be defined loosely as tinnitus with origins outside the conventional auditory pathway but arising from neural interactions with the auditory system. Somatic tinnitus is not the same as Somatosounds which derives from say a glomus tumour or carotid artery stenosis and which are mechanical in origin and may even be audible to the observer as objective tinnitus.

Levene (1999) from a series of experiments postulated that somatic tinnitus was a result of an interaction (disinhibition) of the dorsal cochlear nucleus by adjacent, medullary somatosensory nuclei and their associated tracts. These particular neurons receive input from, amongst other areas, the nearby trigeminal, facial, vagal and glossopharyngeal nerves.

This theory helps explain Rubinstein's observation that about one third of his patients could influence their tinnitus with jaw movements or pressure on the temporomandibular joint (Rubinstein 1993). Levene and Kiang (1995) found that about 20% of their tinnitus clinic patients could alter the acoustic properties of their tinnitus by head and neck movements or by muscle contraction such as clenching the teeth. What happens to auditory perception in patients without tinnitus when the same actions are made is unclear.

Nevertheless there is a lot of clinical observation to suggest that manipulating the temporomandibular joint can alter tinnitus and so the next step is to postulate that altered temporomandibular joint function can indeed initiate tinnitus

Tinnitus is an independent symptom.

Tinnitus can be related to hearing loss, but generally in these cases the underlying process is metabolic, vascular, infective or acute acoustic trauma (e.g. otosclerosis, Meniere's disease, viruses or blast injury). The tinnitus still remains as an independent symptom and I suggest that the original basic condition gives rise to the hearing loss or gives rise to the tinnitus or to both depending on the nature of the disturbance. That is, they are both *symptoms* of the one original basic common pathology.

In cases with no obvious aural pathology, the tinnitus more often is due to another cause (usually the TMJ) than the cause of any a demonstrable hearing deficit (eg due to presbycusis, industrial hearing loss).

In many cases, tinnitus may be caused by trauma to the temporomandibular joint thus triggering a type of trigeminal neuralgia. It is possible this trigeminal irritation leads to a spasm of the tensor tympani or reflex activities carried out by other neural agencies, perhaps involving the facial nerve as well; perhaps in the manner suggested by Levine(above). The trauma is caused mainly by dental malocclusion and less often by direct injury such as in whiplash or striking the jaw, or procedures in the Dentist chair.

Thirty years of clinical practice with specific attention to this problem have convinced me of my findings. I have no doubt. I leave it to my research colleagues to perform a statistical study and hope this article will stimulate them to do so.

Clinical experience indicates that the temporomandibular joint (TMJ) is the cause of the tinnitus in significantly more than 80% of the patients who present with the symptom in the absence of a significant hearing loss. As both temporomandibular joint dysfunction and tinnitus are common conditions in the community, the final diagnosis is often one of exclusion. Whether there is any specific aural pathology or not, careful assessment of the TMJ's should always be carried out. This does not take long. As one examines the mouth, ask the patient to bring their back teeth together and note if there is an effective grinding mechanism molar to molar.

Note if the molars fail to meet on one side or another on full occlusion, or if there are missing molars, or the apposition is uncomfortable with sloping teeth or a higgledy-piggledy disposition; these are the commonest elements in causing problems with the TMJ.

If there is a gross overbite of the incisors (“buck teeth”), the jaw has to be protruded in a subluxating manner in order to effect a cutting bite. Such repeated movements necessary for eating over a number of years causes damage to the TMJ cartilages. This results in the various symptoms with or without tinnitus and in more progressed cases crepitus.

Where the upper incisors cover more than the upper third of the lower incisors on occlusion, the need to allow lateral movement to effect grinding of the food causes abnormal movements to simultaneously free the hindering effect of such restriction. A similar situation exists in the presence of an interlocking disposition about the lateral incisors and canine area.

In fewer instances there is no obvious overt malocclusion to our “non-Dentist” eyes, and the only clues are the temporomandibular joints themselves. The dentists of course would appreciate the finer details of malocclusive anatomical and functional factors beyond our simple gross observations.

Chewing on one side causes more movement of the TMJ on the opposite side, and in the majority of cases (? approximately 80 %) it is this opposite side that has the greater or only tinnitus. That is, the side with the missing molars. A loose tooth or denture or painful condition of one side of the mouth will force the patient to eat unevenly. The patient will recall that it was then this tinnitus began. A tender molar with referred symptoms should be excluded.

An equally important assessment is the tenderness and movement of the temporomandibular joint. If you press hard enough whilst the patient is opening and closing the mouth repeatedly, the joints are somewhat tender. It takes experience to know how much tenderness is normal. It doesn't take too long to appreciate when one joint is more tender than the other, and one then is delighted to find that this is the side in which the patient experiences more tinnitus. Or it may be the *only* side that the patient has tinnitus.

The tenderness may stretch over a line of 1 ½ centimeters from the actual joint itself down along the posterior border of the condyle and ramus of the mandible. One may also elicit crepitus. Problem joints also tend to “pop in and out” as the patient opens and closes their mouth. One can observe whether the opening and closing of the mouth is even or occurs in a zig-zag fashion.

Sometimes the audiogram shows a little hearing loss on the same side as the tinnitus. This raises the question once again as to whether the tinnitus is responsible for the patient being unable to respond accurately to the audiometric tone until it is loud enough to overcome their tinnitus. The apparent hearing loss may not be “authentic”. Is it that the tensed intratympanic muscles cause an increased impedance and so contribute to the “blocked” feeling? The other side of the debate is that there is a pre-existing hearing loss which gives rise to the tinnitus and, if there is definite unilateral hearing loss then an MRI scan is mandatory to exclude cerebello-pontine angle (CPA) pathology. Of course both of these situations may exist.

If appropriate management of the temporomandibular joint fails to resolve the audiometric anomaly then the CPA must be investigated by MR imaging.

Even in industrial hearing loss, it is more often found that the tinnitus is in fact arising from the temporomandibular joint and not the damage to the cochlea. Occasionally one can't be sure, particularly if the audiogram has a precipitous type of hearing loss in the high frequencies.

Similarly in cases of whiplash trauma, whilst injury to the cervical spine is often blamed as the cause of tinnitus, it is usual that there is a concomitant “jaw lash” injury resulting in tender temporomandibular joints which is the cause of the tinnitus. Studies have indicated that TMJ trauma occurs in figures extending from 87% to 96% of cases of whiplash injuries following motor vehicle accidents (Garcia & Arrington; 1996). Also one cannot exclude a direct injury to the joint during the rough and tumble of an accident.

Once the TMJ is injured, resolution is difficult. A pre-existing malocclusion prevents proper rest for the joint and the constant and repetitive need to chew, maintains the trauma. The tinnitus thus persists. Such direct injury to the joint can occur during dental surgery, or where the mouth is kept open for an hour or so for a long dental procedure. Dentists with perspicacity recognise this.

As people get older they are prone to experience tinnitus. This may well be due to the gradual deterioration of the teeth with age or with uneven wear of the TMJ cartilage over time. Do not assume audiological deterioration as the cause of the tinnitus. Examine the mouth and the TMJ and look for the correlations.

Dysacusis and Hyperacusis

The most fascinating discovery has been that these factors also apply to the symptom of dysacusis. The complaint is often that the hearing in the one ear has a “tinny or hollow character” as compared to the other ear. A relatively common description is that of “echoing effect” on hearing sounds or speech. The alleviation of the tinnitus following advice to correct the dental malocclusion is compelling proof.

An immediate consultation with the Dentist is not suggested, but the patient is instructed to avoid biting on hard food such as carrots, tough meat or nuts. Chewing gum is absolutely prohibited. This alone in some cases resolves the problem! The patient is to avoid opening their mouth too wide such as in biting an apple; it should be sliced.

Coercing the patient into following this advice for a period of four weeks almost always reduces or relieves the tinnitus and dysacusis. This convinces the patient that the diagnosis is correct, and if they are continuing to have residual symptoms or if the occlusion is bad enough, they are motivated to seek dental advice.

Similarly, temporary sensitivity or distress to louder sounds or noise (hyperacusis) may resolve with management of the TMJ.

It is suspected that such TMJ problems are a common cause in cases of irregular clicking sounds thought to be caused by clonic spasm of one or either intratympanic muscles. In two cases of facial tic an ipsilateral TMJ disorder was also present. Insufficient cases prevent a firm conclusion but suspicion is high.

The fluctuating nature of these symptoms may well be due to the variable activity of the TMJ in chewing. The hard food you ate yesterday may be exacerbating the symptoms today.

Pain and Pressure – sex differences

Another important observation is that more women than men tend to suffer pain and tenderness of the TMJ. They also tend to develop atrophy of the anterior part of the temporalis muscle so there is a dip at the side of the head lateral to the orbit and above the zygomatic bone. This is easily seen when observing the anterior facies.

Men generally do not complain of any pain but some can experience temporal headache, pain across the face, a blocked feeling in the ear, tinnitus, dysacusis, pain radiating down the neck, itchy ears etc., but their jaw joint in most cases is not tender.

This does not exclude the diagnosis. All the other observations are the same. Men generally have a sense of fullness or blockage in the ear rather than pain. They have the tinnitus and often “clogged itchy ears”. The dental malocclusion and excess mobility of the TMJs reveal the diagnosis in the absence of any other cause.

The injured jaw joint irritates the surface in the ear canal so that the patient experiences an “itchy ear” or a feeling of “water in the ear”. It is very common. The skin of the external auditory meatus appears normal. A cold wind or environment may make the ear ache, akin to any other joint problem. In some cases I suspect that the formation of wax is excessive in the affected side.

Tinnitus with pain

Some people present with distressing earache or pain on the side of the head or radiating across the face. In these cases injection of 0.5 -0.75ml of a syringe filled with 0.3ml of Xylocaine 1-2% with 1ml of Depomedrol (a long acting potent steroid) will result in relief of the pain and concomitant alleviation of the tinnitus. The injection is over the tender area, joint capsule or posterior border of the ramus of the mandible.

Sometimes the pain is of less acute nature, but the patient is financially disadvantaged and hasn't got the facility of dental attention, or they have been to the Dentist who may be unable to assist either because the malocclusion is too complex or the expense is too great. One has no other option but to try such injection and this is usually successful in relieving the pain and the symptoms.

Although the underlying malocclusion still remains, most people do not seem to suffer recurrences of the pain for a long time (years). Perhaps the dental trauma in such cases was acute (e.g. biting something hard, or visit to a Dentist). Some patients have had sinus surgery performed for minor radiological findings when the real cause of the pressure or pain is from the temporomandibular joint so that the sinus operation does not relieve the symptoms.

Bad pain may be experienced in areas away from the TMJ, such as over the cheek or under the angle of the jaw. Whenever there is inexplicable pain about the face or head the TMJ should be considered, especially if tinnitus is also a symptom.

Tinnitus/without pain

On two occasions patients without pain, but exhibiting tenderness of the temporomandibular joint on the side of the tinnitus, have agreed to injection in the joint area with Steroid with resulting relief of the tinnitus. The temptation is to perform this on many patients but, particularly in this litigious society, it is difficult to offer an injection about a joint when the patient is not suffering from a pain in the joint.

Who knows whether they may develop other symptoms and blame it on the injection! As this procedure is not yet recognised by our peers, the legal situation could be uncomfortable.

Postulations

In an effort to stimulate the reader to focus their own thoughts on the underlying mechanism, I postulate that tinnitus and other manifestations of the temporomandibular joint dysfunction could be explained by the ramifications and reflexes associated with the trigeminal nerve. In other words a type of peripheral neuromuscular reflex. Other links and reflexes perhaps involving the 7th cranial nerve could explain tension or interference with the ossicular chain causing a sensation of blockage in the ear and tinnitus. As injury to other joints usually result in spasm of the muscles working that joint, then there is spasm of the associated muscles including the temporalis muscles and masseter muscle, and conceivably the tensor tympani which is also supplied by the trigeminal nerve.

In contrast, in the references already cited, Levene (1999) leans to a central neural mechanism reacting with the dorsal cochlear nucleus.

Significance

It is important that these observations be clarified and confirmed allowing acceptance by the ENT Fraternity, so that pressure can be put on to our Dental colleagues to focus on the tinnitus aspect of TMJ problems. Perhaps simpler management of TMJ problems orientated in this direction can be established.

Summary

1. Tinnitus and Deafness (hearing loss) are essentially two separate symptoms and mostly unrelated.
2. Though the occurrence of tinnitus in patients with temporomandibular joint problems is acknowledged to some degree by the medical profession and by some Dentists, this article emphasizes that the TMJ may be a significant if not the major cause.
3. This article also suggests that hitherto obscure conditions such as dysacusis may be caused by temporomandibular joint problems, as may temporary hyperacusis.
4. It is suspected that clicking tinnitus and also facial tic maybe associated with ipsilateral TMJ disorder.
5. The tinnitus of presbycusis could well be due to deteriorating mechanics of the bite as age takes it toll on the teeth.
6. Fluctuations in tinnitus can be explained by variable activity of the TMJ (in chewing and other actions).
7. In all cases of tinnitus, regardless as to the presence or not of hearing loss, the temporomandibular joint must be considered as a likely cause, and all the findings weighed carefully. In the absence of other causes, management of the TMJ and the bite often resolves the problem.

This knowledge will remove from the ENT Specialist the frustrating and difficult consultation with the patient complaining of tinnitus. No longer can one shrug their shoulders and offer questionable or unconvincing advice. It is a pleasant relief for both the patient and the Doctor.

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